

REMARKS**I. STATUS OF THE CLAIMS**

Claims 1-5, 7-8, 14-16 and 18 are currently pending.

No claims have been amended.

Reconsideration is respectfully requested.

II. REJECTION OF CLAIMS 1-5, 7, 8, 14, AND 15 UNDER 35 USC 102(B) AS BEING ANTICIPATED BY BUSIO ET AL. (US 2001/0005115 A1)

An Information Disclosure Statement is being filed contemporaneously herewith disclosing "Sol-gel dielectric layer for PDP front plate" (hereafter, "the Busio article") by J.M.M. Busio et al., Asia Display/IDW '01, pp. 1753-1754. Sol-gel processing is generally used for preparing glassy layers at low temperatures by chemical polymerization in a liquid phase. That is, a gel is formed from which glass may be derived by the successive elimination of interstitial liquid and the collapse of the resulting solid residue by sintering.

In the Busio article, Busio does not describe that the SiO_2 layer has Si-H bonds. If SiO_2 bonds were present, a Si-H bond would show a peak at 2250 cm^{-1} . However, as is clear from FIG. 2 of the Busio article, reproduced below for the Examiner's convenience, no such Si-H bond is present in a sol-gel prepared by the Busio method (that is, neither the Busio article nor Busio et al. (US 2001/0005115 A1) teaches a dielectric having Si-H bonds):

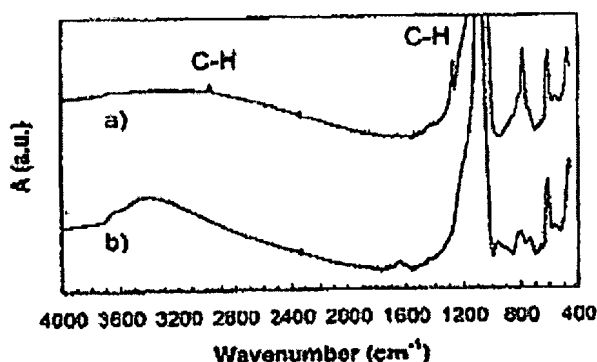


Figure 2: IR spectrum of a) 1 micron sol-gel dielectric on α -Si and b) as (a) after exposure to Xe_2 excimer radiation.

In paragraphs [0024]-[0030] of Busio et al. (US 2001/0005115 A1), it recites:

EXAMPLE

[0024] The following sol-gel (emphasis added) was made:

[0025] 200 gram colloidal silica (Ludox®) (emphasis added) was mixed with

[0026] 200 gram methyltrimethoxysilane ($\text{CH}_3\text{Si}(\text{O}-\text{CH}_3)_3$) (MTMS)

[0027] 18 gram acetic acid and

[0028] 5 gram tetraethylorthosilicate (TEOS).

[0029] A layer was administered using the so-called doctor blade method.

[0030] After heating to 400°C, a clear well-adhering transparent dielectric layer with a thickness of 10 micrometer (± 1 to 2 micrometer) was formed (in an inert gas atmosphere like for instance nitrogen, the material can be heated to 500 to 550°C). Using the doctor blade method a maximum thickness of approximately 30 micrometer could be obtained. Thicker layers would crackle. These relatively large thicknesses are obtainable due to the presence of MTMS (or more precisely the alkyl groups in the MTMS). During the formation of the dielectric layer the alkoxy groups (-Oalkyl) react with each other forming oxygen bridges. The alkyl groups however do not participate in these reactions but are incorporated in the dielectric layer. Their presence in the dielectric layer is shown in infra-red measurements. In the infra-red spectrum a band around 3000 cm^{-1} is present corresponding to the C-H vibrational band The less than complete number of interconnections between the Si and O atoms presumably results in a better mechanical flexibility of the dielectric layer. As a result during heating of the pre-cursor to obtain the dielectric layer differences in thermal expansion between the dielectric layer and the substrate can be more easily accommodated and as a result the layer shows much less cracks. Compared to dielectric layers made from glass frit paste it was also found that the transparency of layers of equivalent thickness had increased. A higher transparency is an advantage since any loss of light in the dielectric layer reduces the brightness of the display device. (emphasis added)

Hence, Busio et al. (US 2001/0005115 A1) teaches away from forming a SiO_2 layer with Si-H bonds. Instead, Busio et al. (US 2001/0005115 A1) teaches that the SiO_2 layer is formed from colloidal silica (Ludox®) and methyl-trimethoxysilane by sol-gel processing.

Thus, it is respectfully submitted that there is no basis for the Examiner's conclusion that inclusion of some Si-H bonds is inherent in the properties of the manufactured layer.

In contrast to Busio et al. (US 2001/0005115 A1), it is respectfully submitted that independent claim 1 recites in part: "the dielectric layer is a SiO_2 film, having bonds of hydrogen with silicon as a residual in the film," which is different from the dielectric layer of Busio et al. (US 2001/0005115 A1). Independent claim 5 similarly recites, in part: "a dielectric layer formed on the substrate so as to cover the electrodes and made of a SiO_2 film, having bonds of hydrogen with silicon as a residual in the film, of a thickness in a range of 5 to 15 μm ," which is different from the dielectric layer of Busio et al. (US 2001/0005115 A1). Similarly, independent claim 14 recites, in part: "the dielectric layer having a thickness in a range of 5 to 15 μm , and being a SiO_2 film having bonds of hydrogen with silicon as a residual therein," which is different from the dielectric layer of Busio et al. (US 2001/0005115 A1). Also, independent claim 15 recites, in part: "a dielectric layer covering the display electrodes, having a thickness in a range of 5 to 15 μm , and being a SiO_2 film having bonds of hydrogen with silicon as a residual therein" which is different from the dielectric layer of Busio et al. (US 2001/0005115 A1).

Hence, the dielectric layer of Busio et al. (US 2001/0005115 A1) and the dielectric layer of the claimed invention are different in structure.

Hence, Busio et al. teaches away from independent claims 1, 5, 14 and 15 of the present

invention. Since claims 2-4 and 7-8 depend from independent claims 1 and 5, Busio et al. teaches away from claims 2-4 and 7-8 also.

Thus, it is respectfully submitted that claims 1-5, 7, 8, 14, and 15 of the present invention are not anticipated under 35 U.S.C. §102(b) by Busio et al. (US 2001/0005115 A1).

Reconsideration is respectfully requested.

III. REJECTION OF CLAIMS 16 AND 18 UNDER 35 USC 103(A) AS BEING OBVIOUS OVER NAKADA ET AL. (US 2003/0030375) IN VIEW OF UEMURA ET AL. (USPN 6,650,063)

It is respectfully submitted that neither Nakada et al. (US 2003/0030375) nor Uemura et al. (USPN 6,650,063) teaches or suggests a dielectric layer that includes Si-H bonds. Nakada et al. (US 2003/0030375) recites in paragraph [0035]: "The dielectric layer 14 composed of the silicon oxide layer, in the present embodiment, is formed by a sputtering method, as will be described later." Uemura et al. (USPN 6,650,063) teaches a dielectric layer of a low melting point glass (col. 5, lines 27-28), but does not teach a dielectric layer having Si-H bonds.

A problem solved by the present invention is prevention of hydrogen discharge from the dielectric SiO₂ layer. Such discharge of hydrogen degrades phosphor, decreasing the useful life of a PDP. By utilizing "a dielectric layer made of a sheet frit glass formed on the substrate by baking, being a SiO₂ film containing bonds of hydrogen with silicon as a residual therein, and having a thickness in a range of 5 to 15 μm, an intermediate layer formed on the dielectric layer and shielding the dielectric layer from vacuum ultraviolet light generated by a discharge in a discharge space of the assembly, the intermediate layer being made of at least one compound selected from the group consisting of an Al compound, a Y compound, a Ti compound, a Zn compound, a Zr compound, a Ta compound and SiC, and a protective layer covering the intermediate layer and made of MgO," as recited in independent claim 16, the present invention prevents such hydrogen discharge.

In addition, it is respectfully submitted that, in accordance with MPEP 2143.03, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). In the present instance, neither Nakada et al. (US 2003/0030375) nor Uemura et al. (USPN 6,650,063) teaches or suggests a dielectric layer that includes Si-H bonds.

Hence, it is submitted that claims 16, and claim 18 which depends therefrom, of the present invention are not obvious under 35 U.S.C. 103(s) over Nakada et al. (US 2003/0030375) and/or Uemura et al. (USPN 6,650,063), alone or in combination.

Reconsideration is respectfully requested.

IV. CONCLUSION

In view of the above, it is respectfully submitted that the application is in condition for allowance, and a Notice of Allowance is earnestly solicited.

If any further fees are required in connection with the filing of this response, please charge such fees to our Deposit Account No. 19-3935.

Respectfully submitted,

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